

REMARKS

Claims 1-2 and 4-10 are pending in the present application. Entry is respectfully requested.

The Applicants note that the Office Action Summary does not indicate whether the drawings filed in the application are acceptable. Confirmation of their acceptability is respectfully requested.

Claims 1-2 and 4-10 stand rejected under 35 U.S.C. 103(a) and being unpatentable over Admitted Prior Art (APA) in view of Wang, *et al.* (U.S. Patent Number 6,383,920). Reconsideration of the rejections and allowance of claims 1- 2 and 4-10 are respectfully requested.

In the present invention of independent claim 1, an isolation layer includes an “oxide layer and a nitride liner” that are “sequentially formed on the surfaces” of “both the first and second regions” of a “trench”, and “the oxide layer is thicker in the first region than in the second region”.

In the present invention of independent claim 9, “an oxide layer... is formed on an upper surface of the first trench”, and an “isolation layer...is formed on the first and second trenches”. The isolation layer includes “an oxide liner and a nitride liner that are sequentially formed on the oxide layer of the first trench and on an upper surface of the second trench”. Also, “the oxide layer and oxide liner in the first trench is of a thickness that is greater than the oxide liner in the second trench”.

As stated in Amendment A, filed on March 30, 2005 in response to the Office Action of January 12, 2005, APA fails to teach or suggest a semiconductor device comprising an isolation layer that includes an “oxide layer and a nitride liner” that are “sequentially formed on the surfaces” of “both the first and second regions” of a “trench”, as claimed in claim 1. In APA, no oxide layer is formed along the surface of the second region of the trench. Thus, it follows that APA further fails to teach or suggest that “the oxide layer is thicker in the first region than in the

second region”, as claimed in claim 1, because, in APA, there is no oxide layer in the second region.

APA further fails to teach or suggest a semiconductor device comprising an isolation layer that includes “an oxide liner and a nitride liner that are sequentially formed on” an “oxide layer of” a “first trench and on an upper surface of” a “second trench”, wherein “the oxide layer and oxide liner in the first trench is of a thickness that is greater than the oxide liner in the second trench”, as claimed in claim 9. Instead, in APA, no oxide liner is formed along the surface of the second trench.

Wang, *et al.* discloses a process for forming a dual damascene structure. Trenches 422 are formed in an upper dielectric layer 412 and a first liner 418 is deposited over the dielectric layer 412 and trenches 422. The first liner 418 is described as comprising “one or more metals..., or any other refractory metals and their nitrides”. A via 416 is formed in the upper dielectric layer 412 and in a lower dielectric layer 408 between neighboring trenches 422. A second liner 424 is deposited over the resulting structure. The second liner 424 is described as comprising “one or more metals..., or any other refractory metals and their nitrides”. The trenches 422 and via 416 are filled with a conductive metal 426, that is planarized using chemical-mechanical polishing (CMP) (see Wang, *et al.*, FIGs. 4A-4F, and column 13, line 23 - column 14, line 38).

Wang, *et al.* fails to teach or suggest a semiconductor device comprising an isolation layer that includes an “oxide layer and a nitride liner” that are “sequentially formed on the surfaces” of “both the first and second regions” of a “trench”, as claimed in claim 1. In Wang, *et al.*, no such “oxide” layer is formed in either the trench 422 or via 416. Nor is a “nitride” liner then formed on the “oxide” layer in Wang, *et al.* Instead, in Wang, *et al.*, a metal, refractory metal, or refractory metal nitride liner 418, 424 is formed in both the trench and via, and then a metal fill layer is provided on the liner 418, 424. Wang, *et al.* further fails to teach or suggest “the oxide layer is thicker in the first region than in the second region”, as claimed in claim 1. In Wang, *et al.*, like the APA, there is no “oxide” layer present in the via 416.

Wang, *et al.* fails to teach or suggest a semiconductor device comprising an isolation layer that includes “an oxide liner and a nitride liner that are sequentially formed on” an “oxide

layer of” a “first trench and on an upper surface of” a “second trench”, as claimed in claim 9. In Wang, *et al.*, no such “oxide” liner is formed in either the trench 422 or via 416. Nor is a “nitride” liner then formed on the “oxide” liner in Wang, *et al.* Instead, in Wang, *et al.*, a metal, refractory metal, or refractory metal nitride liner 418, 424 is formed in both the trench and via, and then a metal fill layer is provided on the liner 418, 424. Wang, *et al.* further fails to teach or suggest “the oxide layer and oxide liner in the first trench is of a thickness that is greater than the oxide liner in the second trench”, as claimed in claim 9. In Wang, *et al.*, like the APA, there is no “oxide” liner present in the via 416.

It is submitted that the combination of APA and Wang, *et al.* fails to teach or suggest a semiconductor device comprising an isolation layer that includes an “oxide layer and a nitride liner” that are “sequentially formed on the surfaces” of “both the first and second regions” of a “trench”, and wherein “the oxide layer is thicker in the first region than in the second region”, as claimed in claim 1. It is further submitted that the combination of APA and Wang, *et al.* fails to teach or suggest a semiconductor device comprising an isolation layer that includes “an oxide liner and a nitride liner that are sequentially formed on” an “oxide layer of” a “first trench and on an upper surface of” a “second trench”, wherein “the oxide layer and oxide liner in the first trench is of a thickness that is greater than the oxide liner in the second trench”, as claimed in claim 9. Accordingly, reconsideration and removal of the rejection of claims 1 and 9 under 35 U.S.C. 103(a) as being unpatentable over the combination of APA and Wang, *et al.* are respectfully requested.

Accordingly, reconsideration of the rejection and allowance of independent claims 1 and 9 is respectfully requested. With regard to dependent claims 2, 4-8 and 10 it follows that these claims should inherit the allowability of the independent claim from which they depend.

Closing Remarks

It is submitted that all claims are in condition for allowance, and such allowance is respectfully requested. If prosecution of the application can be expedited by a telephone conference, the Examiner is invited to call the undersigned at the number given below.

Respectfully submitted,

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